



CLIENT: Khalda Petroleum Company

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DOCUMENT TITLE: HAZID Terms of Reference

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REVISIONS

Section	Change

HOLDS

Hold No.	Section	Description

ABBREVIATIONS

EER	Escape, Evacuation and Rescue
EGPC	Egyptian General Petroleum Company
ESD	Emergency Shut Down
FEED	Front End Engineering Design
GOGC	Genesis Oil and Gas Consultants Ltd
HAZID	Hazard Identification
HAZOP	Hazard and Operability
HP/LP	High Pressure / Low Pressure
HS&E	Health, Safety and Environmental
HVAC	Heating, Ventilation and Air Conditioning
KPC	Khalda Petroleum Company
MAH	Major Accident Hazard
P&ID	Piping and Instrumentation Diagram
PFP	Passive FIRE Protection
PMC	Project Management Contractor
SAMS	Safety Action Management System
SOL	Start Of Line
SIL	Safety Integrity Level
SIMOPS	Simultaneous Operations
UPS	Uninterruptible Power Supply

1 INTRODUCTION

1.1 Project Background

Qasr is a large, normally pressured gas-condensate reservoir located in the Western Desert of Egypt approximately 525 km west of Cairo. The field is operated by Khalda Petroleum Company (KPC), a joint venture between Apache Corporation and Egyptian General Petroleum Company (EGPC).

Figure 1-1 Qasr Development Location



Field production is initially handled at the Start of Line (SOL) Qasr Plant. After initial treatment (cooling and water removal) the gas/condensate is exported to a combination of the Salam, Tarek and Obaiyed gas plants for further treatment.

The Qasr gas and condensate currently free flows from the wellheads through the Qasr Phase I and Phase II facilities and export pipelines to the SHAMS manifold and Salam gas plant under reservoir pressure. As the reservoir pressure declines the peak gas rate of 800 mmscfd will no longer be achievable. The Qasr Compression Project is designed to improve recovery as the reservoir production rate and pressure decline.

The Qasr Compression Project scope comprises:

- Gas turbine driven single stage compressor sets
- Condensate export pumps
- Power generation
- Utility systems

1.2 Purpose

This Terms of Reference document for the Hazard Identification (HAZID) workshop for the Qasr Compression Project has been prepared to ensure a common understanding by all parties involved prior to commencement of the study.

The HAZID study is to be carried out in line with the principles laid out in Reference 1. The HAZID intent is to ensure that all hazards and their impacts are identified, and the measures put in place to prevent, mitigate or control these hazards are incorporated into the design. The aim of this HAZID study will be to:

- Identify hazards with a potential to impact personnel, or damage assets;
- Identify major accident hazards (MAH); and
- Recommend actions which further investigate, safeguard against, reduce or eliminate hazards.

This is to be undertaken with reference to discrete nodes on the site layout.

1.3 Scope

The scope of this document is applicable to the facilities provided as part of the Qasr Compression Project FEED and only applies to the GOGC scope of work, and will be conducted in accordance with GOGC HAZID Procedure; CON-PR-420.

This document is structured as follows:

- Section 2: Details the time, date and location of the HAZID and includes a list of attendees
- Section 3: Lists the documentation required for the HAZID study
- Section 4: Describes the HAZID methodology
- Section 5: Details the requirements of the HAZID report

Supplementary information is provided in Appendices A, B & C.

1.4 Terminology

The word “shall” is to be understood as a mandatory requirement.

The word “should” is to be understood as strongly recommended.

The word “may” is to be understood as an action to be undertaken at the SUPPLIER’s discretion.

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1.5 Definitions

For the purpose of this document, the following definitions apply:

COMPANY	The Khalda Petroleum Company (KPC)
ENGINEER	Genesis Oil and Gas Consultants (GOGC)
CONTRACTOR	EPC Contractor

2 PLANNING

2.1 Timing and location

Timing: The HAZID study will take place on 12th September 2011.

Location: London

The following facilities will be provided:

- Sufficient room and tabletop lay down area for team members to deploy drawings and documents;
- A3 drawings for each team member;
- Marker pens for the team;
- A screen for projected action sheets;
- A flipchart to allow presentations and explanations to be made;
- Wall area to pin up master copies of drawings; and
- PC & PC projector.

2.2 Study members

	Name	Position
1	Rod Bayliss	HAZID Chairman
2	Mohamad Darwich	Scribe
KPC		
3	Ayman Saleh	Project Manager
4	Samir Saad	HSE
5	Moataz El Salakawy	Projects General Manager
6	Mostafa Nabawi	Gas Operations General Manager
7	Mark Konecki	Deputy Gas Operations General Manager
8	Ibrahim Hammad	Process
9	Farrag AbdelKader	Process
10	Mohamed Ismail	Control & Instrument
11	Fahim Lotfy	Electrical / Ops
12	Ahmed Abdelmaksoud	Mechanical
13	Ashraf Salah	Mechanical
PMC		
14	Richard Catling	Project Management
15	Somu Janarthanan	Process

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	Name	Position
GOGC		
16	Richard Powell	Project Management
17	Russ Jenkins	HSE
18	Daniel Palen	Process
19	Martin Cooper	Piping & Layout

3 DOCUMENTATION

This section outlines the documentation to be reviewed in the HAZID study.

Table 3-1 Layout drawings

Drawing Number	Title
J08509A-L-DW-14000	Start of Line Overall Plot Plan
J08509A-L-DW-14101	Compressor Area Plot Plan
J08509A-L-DW-14102	Generator Area Plot Plan
J08509A-L-DW-14103	Condensate Area Plot Plan

Table 3-2 PFDs

Document Number	Title
J08509A-P-DW-12101	Existing Coolers / Separators
J08509A-P-DW-12102	Compressors and Export System
J08509A-P-DW-12103	Condensate Handling

Table 3-3 Other Documentation

Document Number	Title
J08509A-P-SD-12001	Process & Utilities Basis of Design
J08509A-P-PH-12005	Flare, Blowdown and Vent Philosophy
J08509A-P-PH-12006	Control, Shutdown and Process Safeguarding Philosophy
J7729A-F-PH-20000	Design HSE Philosophy
J08509A-F-PL-20005	HSE Plan

4 METHODOLOGY

4.1 General

The review shall follow the methodology presented in the Genesis procedure, CON-PR-420 – HAZID (Ref. 1).

4.2 Study Approach

1. COMPANY to clarify project background and describe FEED;
2. GOGC to clarify design intention.
 - Basis of design;
 - Layout principles and constraints;
 - Key philosophies.
3. Study Breakdown:
 - Study nodes; and
 - HAZID guidewords (Ref. 2 – see Appendix A);
4. Hazard Identification process (guideword prompted):
 - Discuss the operations associated with each hazard, and their potential causes for the accidents and their consequences;
 - Identify potential escalation mechanisms and mitigating effects of passive and reactive systems;
 - Identify ways in which the personnel can become injured or fatalities, and contingency measures that can be utilised to reduce the risk of fatality;
 - Make recommendations to reduce risks; and
 - Record the discussion on reporting sheets along with comments or recommendations.

4.3 Study Recording & Actions

- Assumptions and Assurances (Template in Appendix B);
- Study findings (Ref. 3 – see Appendix C);
- Recording in Full.

5 ISSUE OF REPORT

The worksheets will be reviewed on screen with all team members at the point of entry; all actions should be complete, readily understood and agreed by the study team.

The Chairman shall record the review actions in the formal Report with recommendations that will be tracked and managed by the project's Safety Actions Management System (SAMS).

5.1 Report Format

The Report should conform to the following structure: -

1. Summary	Usually no more than a page, highlighting major concerns.
2. Contents List	
3. Introduction	<p>This section should include: -</p> <ul style="list-style-type: none">• Reference to the Terms of Reference• Scope of the Study• List of Study Team Members• Study Session Date <p>This section should also cover the study methodology, identify any difficulties in meeting the Terms of Reference, and include recommendations for further studies to be addressed.</p>
4. Project Description	A brief description of the project intent and scope.
5. Major findings	This section should include the major recommendations and findings determined by the study.
6. References	<p>This section should include: -</p> <ul style="list-style-type: none">• List of nodes references• All other documentation referenced during the study
7. HAZID worksheets	All HAZID worksheets
8. Master drawings	Copies of all the drawings (layouts and PFDs) reviewed during the study should be included with the report, with the nodes studied clearly indicated.

5.2 Safety Action Management System (SAMS)

To ensure that the key study actions and recommendations are captured and tracked to completion, GOGC will implement a SAMS register in accordance with the GOGC procedure (CON-PR-460, Ref. 4).

This register will list all actions arising from the HAZID / HAZOP / SIL workshops in a simple spreadsheet format for action and information. It will also include all recommendations for further work contained in any formal safety studies and any HS&E concerns formally raised by discipline engineers. The register will indicate the status of all actions at the end of FEED and where these actions have been addressed in the project documentation.

All outstanding pre-FEED actions (Ref. 5) will also be tracked.

6 REFERENCES

1. CON-PR-420, 'HAZID'
2. CON-GN-423, 'HAZID Hazards and Guidewords'
3. CON-FM-425, 'HAZID worksheet template'
4. CON-PR-460, 'SAMS (Safety Action Management System)'
5. Pre-FEED HAZID Study Report J7729A-F-RP-20004 Rev C1

HAZID Terms of Reference

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APPENDIX A – HAZID GUIDEWORDS

The listing below is based upon the HAZID Procedure (Ref. 1). Not all guidewords will necessarily be relevant to each node. The list can be adjusted with the approval of the HAZID team, by general consensus.

Hazard Event	Guidewords
Release	Gas
	Liquid
	Condensate
	Prevailing wind
	Venting
	Fugitive
	Gas Ingress
	Bottled Gases Under Pressure
	Other
Fire	Hydrocarbon
	Cellulosic
	Electrical
	Ignition Sources
	Relief / Flare
	Smoke Ingress
	Other
Explosion	Confinement / Congestion
	Air Ingress
	Explosives
	Other
Impact	Rotating Machinery
	Dropped Objects
	Laydown Areas
	Lifting
	Vehicle Movement
	Maintenance
	Mechanical failure
	Other
Structural failure	Primary structures
	Temporary structures
Chemicals	Types
	Handling
	Storage
	Protection
	Other
Transport	Road – Personnel
	Road – Goods
	Other

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Hazard Event	Guidewords
Material problems	Corrosive
	Other
Climatic	Earthquake
	Lightning
	Extreme Weather
	Sandstorms
	Other
Occupational	Hot / Cold Surfaces
	Hot Fluids
	Confined Entry / Asphyxiation
	Working At Height
	Electricity
	Health
	Noise
Safety Systems Failure	Other
	Escape Routes
	EER Equipment
	Primary Muster Area
	Evacuation Means
	Emergency Lighting
	Emergency Power / UPS
	ESD / Blowdown
	PFP
	Firewater
	HVAC
	Equipment of Misuse / Human Error
Construction / hook-up/commissioning	Other
	Release
	Fire / Explosion
	Impact
	Transportation
	Structures
	Safety System Failure
	Occupational
	Other
Deliberate Acts	Sabotage
	Terrorism
	Military Action
Other	Radioactive Sources
	Pyrophoric Materials
	Cryogenic Fluids

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APPENDIX B – LIST OF ASSUMPTIONS AND ASSURANCES

Ref	Description	Verification by

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APPENDIX C – HAZID WORKSHEET TEMPLATE

Job Number: **Project Title:**
Section Number: **Section Description:**
Session Date(s):
Team Members:
Drawing Numbers:

HAZARD	GUIDEWORD	CAUSE	CONSEQUENCE	SAFEGUARDS	MAH	ACTION	BY
		Item 001:				Action 001:	